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3 June 1983

# USSR Report

ENERGY

No. 149

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## USSR REPORT

## ENERGY

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## OIL AND GAS

### SUMMARY OF ACTIVITIES IN SOVIET PETROLEUM INDUSTRY

#### Kazakh Oil and Gas Developments

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 12, Dec 82 pp 11-13

/Article by O. S. Miroshkhin, second secretary of the Kazakh SSR Central Committee of the Communist Party: "New Frontiers for the Oil and Gas Complex of the Kazakh SSR"/

/Excerpts/ The economy of the Kazakh SSR, which is an organic part of the overall national economy of the Soviet Union, is developing today at a rapid pace and in a dynamic manner.

"The Basic Directions for the Economic and Social Development of the USSR in 1981 through 1985 and the Period Until 1990" call for an increase in industrial production within the republic in the 11th Five-Year Plan amounting to 25 percent. Primary emphasis is being placed upon strengthening the base sectors of all-union importance. Primarily this relates to the fuel industry and the power industry. By the end of the five-year plan the annual extraction of coal is to be increased to 134 million tons. The output of electric power will reach 95 billion kW-hours by the end of the five-year plan.

At present the oil and gas refining industry has grown into a large sector of the republic's national economy.

At three production associations nearly 60 drilling, exploration, transportation and other organizations, including ten oil and gas extraction administrations, are in operation. Oil and gas refineries are in operation as are scientific research and design institutes.

Important successes have been achieved in the 10th Five-Year Plan. More than 1.6 billion rubles in capital investment funds have been invested in the development of the sector; eight new deposits have been put into operation, which includes more than 2,500 new oil wells. An important result of the five-year plan has been the creation of a new oil refining region on the Buzachi peninsula.

Within the Embaneft's association, which is among the oldest, the extraction of oil has increased by 15 percent during the five-year plan;

and the amount of drilling has more than doubled. The young collective of the Aktubinskneft' association is in the process of being established.

The assimilation of oil deposits has served as the basis for creating the multi-sector Mangyshlak territorial-production complex. This complex now accounts for 84 percent of the republic's oil extraction and 100 percent of its natural gas extraction. One half of the production of compressed gas, all ethane and dry gas come from this complex.

Many facilities, which are unique in their technological and scientific solution, have been built here.

New, even more grandiose tasks have been given to the laborers of this sector in the 11th Five-Year Plan. These tasks have been defined in passages of the "Basic directions for the economic and social development of the USSR in 1981 through 1985 and the period up to 1990", "Developing the oil industry in regions of Western Siberia and the Kazakh SSR at a more rapid pace....To expand geological exploratory work for oil and gas in Western Kazakhstan, to speed up the assimilation of oil deposits on Buzachi Peninsula." The USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry is given an important role in achieving these goals.

Buzachi is a very difficult region to assimilate. The peninsula, which is located some 300 kilometers from inhabited regions, was devoid of all forms of communications and power bridges. For this reason it was necessary to solve a multitude of problems connected with the construction of these facilities. How to reach the deposits located on the gently sloping shore of the Caspian Sea, which is periodically flooded by a tidal wave? Powerful mechanized detachments, which were formed in the cities of Shevchenko and Novyy Uzen', came to the northern coastline of the Caspian Sea. First they had to perform an enormous amount of work - build a protective dam, auxiliary railroad tracks, and embankment sites. A pipeline for oil and a road and power transmission lines were built in the direction of the desert-like shore of the Caspian Sea. Where previously there had stood only a solitary camp of geologists and prospectors, well-equipped watch settlements came into being.

The USSR Ministry of the Petroleum Industry, the USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry, and the USSR Ministry of Power and Electrification as well as the Kazakh SSR Ministry of Road Building have developed a program of specific measures for rapidly assimilating the deposits of Karazhanbas and Kalamkas. In particular, it is planned to adopt such progressive methods of building oil and gas enterprises as the assembled-unit design of facilities, the use of piling foundations, and using scaffolding to install utilities and cable systems.

To reinforce the capacity of the subelements of the USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry, which are working on the Buzachi Peninsula, construction and installation organizations within the sector from other regions of the Soviet Union were brought in. The unified efforts of all who participated and are now working on the peninsula have been quite apparent. The valves of the wells were turned on one after the other. In the final year of the 10th Five-Year Plan the first one million tons of oil had already been extracted.

The rapid pace of assimilating the oil deposits of the Buzachi Peninsula was largely achieved through the coordinated efforts of both the local party and soviet organs and the sectoral departments. The office of the Mangyshlak Oblast Party Committee issued a joint decree with the visiting collegium of the USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry. Measures were developed, the realization of which have made it possible to significantly reduce the amount of time required to construct key facilities. For example, the Kalamkas-Karazhanbas-Shevchenko oil pipeline was laid quite a bit more rapidly than usual.

The entire 1985 planned growth in oil extraction is to be obtained by speeding up the start-up and production from oil deposits on the Buzachi Peninsula. In the current five-year plan they are to assimilate more than 230 million rubles in capital investments, to drill hundreds of operating and injection wells, and to build numerous facilities for the gathering, preparation and transporting of oil.

In the decisions of the 26th Party Congress it was emphasized that there is a need to increase the coefficient of oil recovery from the interior of the earth, which is a substantial reserve for multiplying the amount of extraction of liquid fuel and which promotes the economical expenditure of natural resources. The Kazakh SSR oil industry workers and builders, who have a great deal of experience in adopting the most progressive methods for exploiting the depths of the earth, have undertaken to solve this task in a business-like manner. At the Mangyshlak oil fields many engineering and technological innovations, gas lift, hot water injection, and transporting oil through a heated pipeline, have been tested.

When specialists studied the oil deposits on the Buzachi Peninsula, they concluded that they could not be exploited using traditional methods and that the thermal methods of coercing the strata must be implemented from the very beginning. Then the depths of the earth will yield more oil. The draft design for the Karazhanbas deposit was based upon the use of methods of interstratum moist heating and injecting steam under great pressure in the strata. For this purpose unique technological installations, the experience of the operation of which will be widely used in other oil and gas extraction regions of the Soviet Union, are being installed on the peninsula.

The economic ties between the republics are particularly rich and multi-faceted. It is difficult to imagine a more efficient and mature example of such cooperation, in the true sense of the word, than the steel pipelines for carrying oil and gas. Before the revolution, Kazakhstan had only one small-diameter oil pipeline running between Dossor and the port of Rakush in the Urals, a distance of 60 km. Today the total length of the republic's pipelines is approaching 3,900 km; they are equipped with powerful oil pumping stations, cathode shielding systems, communications, remote control and automation. Kazakh oil is delivered to refineries in Orsk, Kuybyshev, Volgograd, Yaroslavl', Krasnovodsk and Baku. In turn the republic receives oil from regions of Western Siberia for refining.

Progressive methods such as the large mechanized equipment sets, which does all work from digging trenches to insulating, laying and backfilling of the pipeline, are being put to use in the construction of the pipeline. Such an organization of work makes it possible to build as much as one kilometer of pipeline every 24 hours.

Work on the Pavlodar-Chimkent oil pipeline is proceeding well. The pipeline covers a distance of 1,500 km. West Siberian oil will reach yet another destination for refining through this steel mainline pipeline, which will intersect the Kazakh SSR from north to south. The builders are striving to put both the line portion of the pipeline and the new capacities of the Chimkent refinery into operation at the same time. The motor vehicle fuel that is made here will be used to supply the rapidly developing industry and agriculture in the south of the republic. The amounts of gasoline to be shipped via the railroads will be sharply reduced. The subelements of Glavtruboprovodstroy [main administration for the construction of pipelines], each in its own section of the line, have initiated a socialist competition to complete the pipeline ahead of schedule.

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#### Uzbek SSR Natural Gas Developments

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 12, Dec 82 pp 13-16

/Article by N.D. Khudayberdyev, Chairman of the Uzbek SSR Council of Ministers: "Comprehensive Assimilation of the Gas Resources of the Uzbek SSR" /

/Excerpts/ Uzbek SSR workers, just as all Soviet people, are greeting the national holiday - the 60th anniversary of the formation of the USSR - with major achievements in all areas of the building of communism.

The Uzbek SSR gas industry entered a qualitatively new and more complicated stage of development during the 11th Five-Year Plan; this stage is characterized by the relocation of the raw material base from Gazli to regions of the Mubarekskaya and Shurtanskaya groups of sulphur dioxide deposits. The more complicated mining and geological conditions

and the greater depth (up to 4,000 meters) of the wells and the greater stratum pressure are common here.

The assimilation of these deposits has required the construction of large capacities for the cleaning and refining of gas and the adoption of several new technical and technological solutions for its extraction, gathering and transporting. The collectives of drillers, builders and operators have successfully dealt with this task. At present in Mubarek the republic's first facility for processing 15 billion cubic meters of sulphur dioxide per year is now in operation; this refinery also produces a high-quality sulphur from the by-products of the cleaning operation.

The construction of the refinery, the preparation of its raw materials base and the solution of several social problems have predetermined the creation of the large Mubarek gas industry complex, which supplies the national economy with commercial gas, gaseous sulphur and other products from the refining. Uzbek gas is also sent to the Tajik, Kirghiz, Kazakh and Russian Federated republics.

The assimilation of the sulphur deposits has required the solution of several important scientific-technical problems, in particular protecting the wells and equipment from corrosion, transporting the sulphur dioxide through gas pipelines over great distances. Due to the efforts of scientists and production specialists these tasks have been successfully solved. The first section of the Mubarek gas refinery was built using domestic equipment.

The rapid pace of the development of the gas industry has created the necessary conditions for solving several key tasks: to fully meet the internal needs of the Uzbek SSR for inexpensive natural gas; to optimize the republic's fuel balance; to actively promote a decrease in the fuel shortage and to raise the efficiency of the fuel balance in the Urals, the Southern Kazakhstan, the republics of Central Asia and partially the Center of the Soviet Union.

Based upon the refining of natural gas in the republic significant capacities have been created for the production of ammonia and nitrogen fertilizers and the "Nitron" fiber /equivalent to US Orlon and Acrylon/. In 1980 in Chirchik the largest installations in the Soviet Union for the production of a chemical product - caprolactam - was put into operation.

All of the republic's large thermal electric power stations, including the Tashkentskaya, Navoyyskaya, Syrdar'inskaya and Takhiatashskaya, burn natural gas. Their total rated capacity is 6,480,000 kW. The construction of the Talmardzhanskaya GRES with a rated capacity of 3,210,000 kW has gotten underway.

Natural gas consumers within the republic include nearly 1,000 industrial facilities and more than 30,000 municipal and services enterprises. Gas is supplied to 171 cities and settlements and to more than 1,500 kolkhozes and sovkhozes.

The extensive use of gas in the national economy has made it possible to significantly improve labor productivity, to reduce the relative norms for the expenditure of fuel and electricity, to diminish the release into the atmosphere of harmful substances, and to improve air quality in cities and the quality of providing fuel to the population of the republic.

The transfer of production facilities which use a large amount of fuel from burning coal to gas has resulted in large economic savings. At the Chirchik Elektrokhimprom /electrochemical industry/ Association there has been a doubling of capacities and a halving of the production cost of manufacturing mineral fertilizers. At the Kuvasayskij Cement Combine the reduction in the expenditure of electricity has resulted in savings of 1.5 million rubles per year. At the Bekabadskiy Cement Plant following its transfer from a liquid fuel to natural gas the annual savings amounted to 1.7 million rubles. For each kilowatt of electricity, which is produced by burning natural gas, some 58 grams of conventional fuel less is expended than in burning coal. According to this indicator the savings in fuel in the power industry has reached 1.4 million tons per year.

A significant shift has taken place within the structure of the fuel balance. In 1981 as compared with 1960 the percentage of coal in the structure of fuel production has dropped from 38.3 to 6.7 percent, while the percentage of natural gas has risen from 6.4 to 89 percent. In the structure of fuel consumption there have also been changes: the consumption of coal has decreased from 54.5 to 13.5 percent, and natural gas consumption has increased from .4 to 65 percent. This has provided the national economy with an economic savings amounting to millions of rubles.

While evaluating the prospects for the development of the gas and gas refining industries, it is necessary to consider several crucial questions, the solution of which depends upon the pace and efficiency of the development of the Uzbek SSR fuel and power complex.

It is necessary to increase capacities for the refining and cleaning of sulphur dioxide and also to raise the throughput capacity of the gas mainlines between the Bukharskiy gas region, Tashkent, Frunze, Alma-Ata, Samarkand, Fergana, Andizhan and Osh. It is necessary to solve the problem of speeding up the introduction of the Kandymskaya group of deposits and the construction on its base of a gas refinery with a productivity on the order of five billion cubic meters of gas per year.

The change in the structure of the gas supply, and particularly the assimilation of the complicated geological-technical conditions of the deposits of sulphur dioxide requires a further raising of the reliability of the gas wells in conditions of the carbon dioxide and hydrosulfide corrosion, raising the efficiency of the operation of the gas refineries and methods for cleaning the gas of sulphur. The efforts of the scientists must be directed at improving the above ground and below ground equipment.

The network of mainline gas pipelines in the direction of Tashkent must be expanded at a faster pace so that their throughput capacity can fully satisfy the growing needs for gas within the republics of Central Asia.

The comprehensive use of the Shurtanskaya group of low-sulphur gas deposits, which contain ethane, are of enormous national economic importance. The decision has been made to do everything possible to speed up the amounts of time required for constructing the Shurtanskiy gas and chemical complex. The creation of this complex will make it possible to provide the national economy of the republics of Central Asia and the Kazakh SSR with a valuable polyvinylchloride raw material, plastic pipes for irrigation construction, films and other articles, as well as a commercial caustic soda for the oil and fat industry.

The organizations of the USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry and the USSR Ministry of the Gas Industry are to play an important role in solving these problems for the further development of the sector. In 1983 the Syrdar'ya to the Tashkentskaya GRES gas pipeline is to be put into operation; it will have lines extending to Akhangaran and Almalyk. It is necessary to expand the system of mainline gas pipelines and to raise the capacity of the Mubarek gas refinery; it is also necessary to complete the infrastructure of the gas deposits at Dengizkul'-Khauzak, Zevardy, Pamuk and others.

To improve the management of the construction work it is feasible to examine the possibility of combining into a single organization, in the example of the VPO /All-Union Production Association/ Soyuzzbekgazprom /Uzbek Gas Industry/, of all subelements of the USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry, which are now base within the Uzbek SSR. This new organization could be tasked with all work starting with the infrastructure of the fields and ending with the construction of the facilities for the distribution and supply of gas to the customers.

Within as short as possible time periods it is necessary to improve the supply to the construction organizations of the USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry and the USSR Ministry of the Gas Industry with reinforced concrete and metal structures based upon the rapid development of its own construction materials base.

These measures will make it possible to improve the coordination of work, to ensure the completeness of assimilating the deposits of gas and reducing the amount of time required for building the facilities. In the final analysis all of this will promote the further development of the Uzbek SSR's gas industry.

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## Tatar ASSR Oil Industry Developments

Moscow STROITEL' STVO TRUBOPROVODOV in Russian No 12, Dec 82 pp 16-18

/Article by G. I. Usmanov, first secretary of the Tatar ASSR CPSU Party Committee: "Towards the Third Billion" /

/Excerpts/ The 26th Party Congress has planned new frontiers for the development of the raw material and fuel and energy base of the Soviet Union. The "Basic directions for the economic and social development of the USSR in 1981 through 1985 and the period up to 1990" has stipulated that oil extraction, including gas condensate, is to reach 620 to 645 million tons. The Tatar ASSR is called upon to play an important role in the realization of this task. Inspite of a certain reduction in the amounts of oil extraction as the result of a natural exhaustion of the deposits being worked, the republic's percentage in the overall fuel balance of the nation will remain quite high. The preliminary work results during the first two years of the five-year plan attest to the possibilities of attaining the planned amounts of oil extraction.

An extensive program of technical reoutfitting and intensification of production is now underway within the oil industry of the Tatar ASSR; major technological solutions are now being developed. This is making it possible to increase the pace of extracting oil from the earth's interior. For example, at the Romashkino oil deposit in connection with the large amounts and complicated geological structure of the productive strata it has not been possible to use the edge water flooding method. Specialists have found an essentially new method for working the deposits using contour water flooding. For the development and adoption of this method in the Tatar ASSR a group of workers from the Tatneft' Association and the All-Union Scientific-Research Institute have been awarded a Lénin Prize.

In subsequent years the industrial methods for working the reserves have been improved; and new, more efficient methods have been adopted. One of these has been the method of including strata for exploitation through the development of flood strating points. The point strating method was first used upon the initiative of scientists from the TatNIPIneft' /Tatar ASSR Scientific-Research Polytechnical Institute of the Petroleum Industry/ and specialists from the Tatneft' Association at the Zelenogorskaya oil platform; the industrial adoption of this method was undertaken sometime later. This system, which was named as the consequence of a competition, came to be used at all new deposits in the Tatar ASSR. It has made it possible to increase the extraction of oil from the sections by 1.5 to 2-fold, while decreasing the relative capital investments for oil extraction by the same amounts.

In connection with the discovery of a group of deposits with oil reserves of an increased viscosity the republic's oil workers were faced with a new task for their efficient development. At present work is underway to adopt the in-situ combustion source technique, and injecting special solutions and steam into the strata.

In putting the republic's oil industry back on its feet an important role was played by the solution of problems having to do with drilling wells. The Tatar ASSR became the first oil region in the Soviet Union where turbine drilling is used on a large scale. Our republic has priority in the industrial method of installing drilling units, which has made it possible to transport equipment along with the drilling tower in the form of several large units on a year-round basis. This can be accomplished without having to disassemble the rig. The transfer to the large-unit method of installation has made it possible to reduce the amount of time required for erecting a drilling rig as compared with 1955 by nearly 7-fold.

A primary trend in the development of the Tatar SSR's oil industry at the present time is the intensification of the extraction of oil through the adoption of the mechanized method of exploiting wells. The mechanized wells that are now operating in the oil fields of the Tatar ASSR are yielding more than 98 percent of the republic's "black gold".

The efforts of many scientific-research institutes, design organizations and plants have resulted in the development of a program for the selection of deep equipment using computers. They have also resulted in the creation of assemblies for the mechanization of work at the wells and for transporting oilfield equipment. A significant amount of work has also been accomplished to improve the system for gathering and transporting oil and gas. Within a very short period of time a method for cleaning oil pipelines using rubber balls was developed and used successfully; this provided an annual savings of 1,200 rubles per well. Other innovations have also been adopted. Today the entire oil well fund at fields of the Tatneft' Association is operating solely on a single pipe hermetically sealed system.

In the Tatar ASSR unit automated installations were first used on a large scale, which has made it possible to significantly reduce the amount of time required for constructing facilities and to speed up the completion of oil deposits for industrial development. The labor intensiveness of construction through industrialization has been reduced for group measurement installations by some 9-fold, for cluster pumping stations for maintaining stratum pressure by some 3.6-fold, and transformer substations by some 6.7-fold.

While giving recognition to the heroic labor of the Tatar oil workers, who are now on their way to extracting a third billion tons of "black gold" from the depths of the republic, it is necessary to mention the construction workers, who have made an enormous contribution to the re-establishment and lifting of the Tatar ASSR's oil industry. The collective of the Tatneftstroy Association /Tatar ASSR Production Association for the Construction of Enterprises for the Petroleum Industry/ has been successfully operating for almost 20 years. During this time the amount of construction and installation work done by them has exceeded 1.5 billion rubles, which has made it possible to create hundreds of commercial parks, powerful complexes for cleaning and stabilizing oil, cluster pumping stations, group installations for gathering oil, some 10,000 kilometers of underground pipelines, power transmission lines and many other facilities.

The builders of the association were the first in Soviet practice to assimilate the industrial unit-complex method of erecting above-ground oilfield facilities and to switch from field to plant conditions some 80 percent of the welding and insulation work during the construction of pipelines. Now the experience of the construction workers of the republic is being extensively put to use and being improved in Western Siberia and in other oilfields of the Soviet Union.

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## OIL AND GAS

### DEVELOPMENT OF OIL DEPOSITS IN WESTERN SIBERIA

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 11, Nov 82 pp 28-30,  
and p 32

/Article by Ya. M. Kagan, Giprotyumenneftegaz /State Designing Institute for the Oil and Gas Industry in Tyumen'skaya Oblast/, Tyumen': "Development of the Designing of the Infrastructure of Oil Deposits in Western Siberia"/

/Text/ The general designer for the infrastructure in Western Siberia oil fields is Giprotyumenneftegaz. Among the decisions which are making it possible to perform oil field work at the assigned pace we must include the use of peat as the foundations for linear facilities (highways and others), the non-peat methods of constructing facilities on piling foundations. Various methods for laying utilities using the carrying capacity of peat bogs (quagmires), floating-cargo carriers and other types of ballasting have been developed. To industrialize construction in the oil fields we have created unitized and complex-unitized methods of building facilities in combination with the above-ground laying of utilities on scaffolding or low supports.

Methods of complex designing of the infrastructure of the oil fields have made it possible to combine at the sites facilities of differing technological purpose and to obtain optimal variants for the siting of facilities and the utilities that connect them. As a result there has been a reduction in the number of construction sites and corridors of utilities have been created which has reduced their length.

The need to further develop the complex and to move into the more northern regions of the Soviet Union, the flooding of wells, and the introduction into operation of the oil deposits with poorer geological characteristics, the adoption of new processes connected with increasing the oil output of the strata - all of this has uncovered new problems. In addition, the lag in the infrastructure, the inadequate development of the repair base while preserving the pace of the growth in extraction have made it necessary to look for other ways to assimilate, which could not only reduce the required capital investments, but also speed up the creation of new capacities in the deposits.

When developing and adopting the complex of technical solutions for enlarging the wells in a cluster as well as the corridor of utilities it is necessary that their design integrate the pipelines, power transmission lines and the LES /probably mobile electric power station/ with the guarantee of safe operation.

#### Evaluation of certain trends in scientific-technical progress

Trends and individual measures	Quantitative evaluation of effect to total volume in percentage	
	Minimum	Maximum
1. Development and realization of a new system of infrastructure and assimilating oil deposits	2.1	6.6
1.1 Development and adoption of a complex of technical solutions for enlarging clusters of wells	.4	.6
1.2 Creation of design solutions for connecting all field utilities (roads, pipelines, power lines)	1.7	6.0
2. Raising the level of industrialization of the construction of oil field facilities	.5	1.0
2.1 Adoption of the super-unit method	.2	.3
2.2 Adoption of organizational-technical solutions for expanding the scale of the use of the complex-unit devices	.3	.7
3. Improving equipment and technology of the infrastructure of the oil deposits	.2	.3
4. Development and assimilation of new technical solutions in road building	1.2	3.2
4.1 Use of non-fiber synthetic materials	.7	1.2
4.2 Development of the method of hydromechanical ground work	.5	2.0
5. Improving the design solutions, technology and organization of constructing pipelines	.4	.5
6. Optimizing design solutions	4.2	10.5

6.1 Optimizing design solutions for siting construction facilities and networks at deposits	1.2	2.5
6.2 Optimizing technical-economic solutions for siting industry in the region, on the whole for Western Siberia and number of newly introduced deposits	3.0	8.0

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Raising the level of the industrialization of the construction of oil field facilities is possible by expanding the use of the unit-complex devices and significantly increasing the number of super units.

In road building and the construction of foundations beneath the clusters of wells the methods of hydromechanical ground work must be further developed. The use of synthetic non-fiber materials will be expanded.

Improving the design solutions, technology and organization of construction of pipelines is possible by improving the methods for working permafrost and flooded soil, the mechanization and automation of welding and installation work, increasing the amount of plant-readied pipes and improving their quality.

Great attention must be given to optimizing the design solutions for the siting of construction projects and networks both at the deposit and on the whole of industrial enterprises in the oil and gas extracting region.

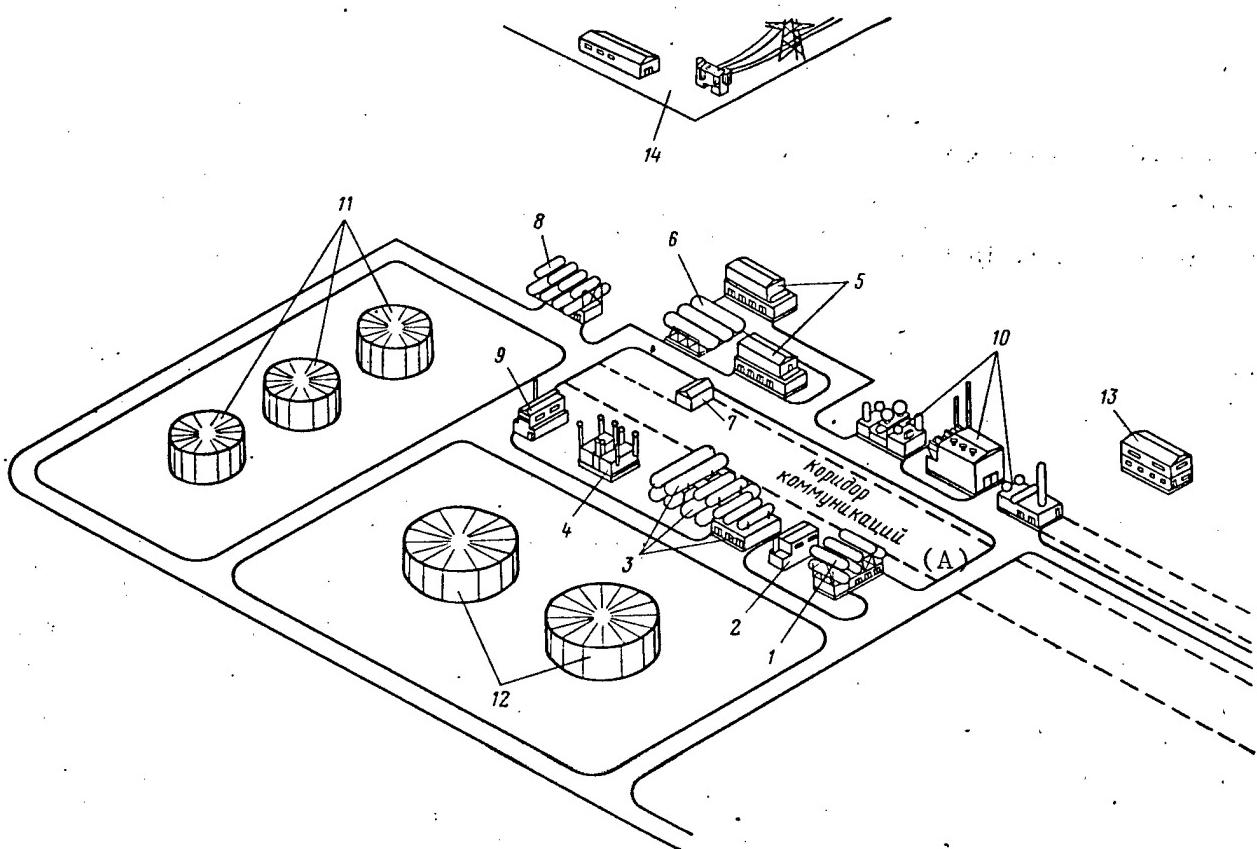
These measures, according to calculations of Giprotyumenneftegaz for the minimum and maximum evaluations, based upon the possible levels of extraction, will make it possible to reduce outlays from 9 to 22.7 percent (See the Table.).

Some of these trends for improving the infrastructure development of the oil fields are already being adopted. When designing the infrastructure for the Sutorminskoye oil field by increasing the average deviation of wells from the vertical the number of wells in a cluster could be increased to 80. This has made it possible to implement the brigade servicing of wells and to develop transportation communications with each cluster, etc.

Such a solution opens up several other possibilities. The increase in the number of wells in a cluster makes it possible to transfer to the cluster sites the separation processes, partial dehydration, and also to place pumps here for pumping water into the strata, compressors for gas-lift exploitation of wells, and heavy duty pumps for extracting oil by the hydraulic piston or flow method. This will significantly simplify deposit pipeline systems, primarily by decreasing and in some cases completely eliminating high pressure pipeline networks for systems to maintain pressure, gas-lift pipelines, etc.

The use of the super units is expanding. Giprotyumenneftegaz has developed super unit designs for cluster and pressure pumping stations, a water intake station, installations for preparing oil, a compressor station and multipurpose units. The Sibkomplektmontazh /Siberian Association for the Installation and Assembly of Equipment/ Association has already started manufacturing some of these. Experience has been gained in transporting the super unit of a pressure pumping station by using a device on an air pillow. Later it is planned to completely equip deposits using facilities in a super unit form.

In the drawing we see the general plan for the infrastructure [overall technical preparedness] of the central facilities of the fields, which have been made up of super units.



General plan of the infrastructure of a deposit with facilities comprised of super units: 1 - Pressure pumping station; 2 - Support unit (air compressor, operator transformers for the use of the deposit); 3 - Installation for preparing oil; 4 - Unit of heaters; 5 - Cluster pumping station; 6 - Unit of separators; 7 - Rake unit; 8 - Unit for cleaning waste water; 9 - Auxiliary unit; 10 - Compressor station for transporting natural gas; 11 - RVS-5000 channel reservoirs; 12 - RVS-10000 reservoirs for oil; 13 - Administrative and housekeeping unit (dining hall, household facilities, operational, etc.); 14 - A 35/6 kV substation. (A) - communications corridor.

The set of super units and the unit-complex devices that are now being used make it possible to accomplish all technical processes: separation, dehydration and desalinization, water injection, compressing of gas for transporting, and cleaning.

The following indicators attest to the efficiency of using the super units.

	Super units	Traditional version
Area, hectares:		
section .....	6	11
building .....	2.5	3.9
motor vehicle passageway .... (within perimeter of section)	1.09	2.23
area in use .....	3.57	6.13
green space .....	.9	1.65
Coefficient, percentage:		
building .....	42	35
area in use .....	60	56
green space .....	15	15

The institute and enterprises of the USSR Ministry of Transport Construction and the specialized construction organizations of Giprotyumenneftegaz have done a great deal of experimental work on the use of non-fiber synthetic materials in the construction of foundations for well clusters and roads. As a result it has been possible to reduce the cost of building one kilometer of various grades of roads by 20 to 40,000 rubles, to reject the use of wood, and to increase the service life. However, the extensive adoption of this method is being delayed due to the lack of the needed amount of these materials. Synthetic non-fiber materials may be used extensively in the construction of passageways along the path.

The solution of these problems is particularly important for the northern regions of Tyumenskaya Oblast and the zones where permafrost is to be found.

The following organizational measures are also important. Thus, it is necessary to build roads on a priority basis by using the backfilling of ground strips for laying oil pipelines and other communications on them. It is necessary to establish the series production of super unit facilities and to create in Tyumen', and possibly in other cities of the oblast, bases for assembling, testing and adjusting them. It is necessary to quickly carry out a set of survey and scientific-technical work on the permafrost survey and the hydrology of surface and underground sources of water. It is important to speed up the adoption of new technological methods for sustaining the pressure of the stratum in the oil deposits. In the areas where the work is being performed it

is necessary to organize the production of materials based upon peat for insulating pipelines and preserving permafrost.

A great deal of interest is being shown in the possibility of constructing various facilities (dams, moorings, roads, foundations for clusters) out of ice or ice soil. Initial experiments, begun in 1981, have demonstrated the promise of this trend.

The experience of the combined work of the research, design and construction organizations, which has been accumulated in Western Siberia, and the extensive adoption of experimental facilities, will without doubt promote the successful solution of the tasks set by the party and government for the designers and builders of Western Siberia.

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## OIL AND GAS

### CALCULATING DESIGNS OF RIGS IN CASPIAN SEA

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 1, Jan 83  
pp 28-30

/Article by R. A. Selimbekova, AzISI /Azerbaijan Institute of Construction and Engineering/: "Off-shore Oil Rigs and Methods for Estimating Their Design"/

/Text/ At present large-unit marine foundations are being used in the Caspian Sea for drilling; the foundations represent a spacious metallic design consisting of a telescopic support posts that are connected in the upper portion by metal girders and by height by means of struts and rigid braces made of pipes.

To secure the legs of the large MNCS\* units to the bottom of the sea drilling filled pilings of a different design are used. The MNCS supports in operational conditions are subjected to significant vertical (1,200-1,500 tons) and horizontal (500 tons) loads and wave action.

The binomial formula, which was proposed in 1946 by Professor Ye. S. Morgenshtern, was the first attempt to solve the problem of calculating the carrying capacity of a drilling filled piling upon a vertical load. However, this formula was only appropriate for soft ground with a coefficient of internal friction of 20 to 25 degrees.

In footnote (1) we see a developed method for calculating the Azneft' type pilings upon the action of horizontal forces (wind, and pressure of the marine wave). In conditions of a horizontal load the piling in the soil operates like a fully rigid beam in a dense elastic foundation. Based upon this for calculating the most appropriate theory is the theory of beams in an elastic foundation, which is based on Winkler's hypothesis of a balance of the resistance of soil to its sagging. The task amounts to a linear equation of the transverse curvature of the shaft with a linear-increasing in depth coefficient of the bottom; the solution of this equation was given in the form of exponential rows.

The support units of the large-unit insular foundations for the depth of the sea at 60 meters and greater are grates structures with an increased flexibility of the shafts, which require a calculation not only

\* [MNCS -- "morskiye nefte-gazovyye stantsii" -- offshore oil and gas rigs].

for strength and local stability, but also for general stability and strength according to a deformed circuit, which takes in problems of strength and general stability of the overall shaft systems.

In footnote (2) we see the power/energy method of calculating the overall stability and strength of the support units for the foundation for research. In using this method, we came up with a reserve coefficient of the overall stability and strength of  $k = 1.58$ . The simplicity of this method is that a large portion of the results of the computations, which are performed in calculating strength, is also used for calculating stability.

Strength and stability of the drilling filled MNGS pilings depend not only upon the piling materials but upon the soil conditions, the disregard of which in the majority of cases leads to large reserves of strength, and sometimes, the opposite, to a decrease in strength. In footnote (3) we have an approximated method for calculating the carrying capacity of pilings, which have been pounded into the soil by means of a vibrator. B. P. Tatarnikov's well known calculating formula for determining the carrying capacity of vibrator-driven pilings serves as the basis for this method.

Experience in the construction of MNGS has shown that the calculation of the strength of supports has been performed according to a simplified circuit, by which the support is viewed as a cantilever beam of a constant rigidity, which has been fixed at a certain conditional depth from the surface of the soil. The influence of lateral reactions of the soil, as a rule, is ignored. In footnotes (4 and 5) we see a more improved calculating circuit, which takes into consideration the actual conditions of the work of the MNGS supports, the variability of the rigidity of the drilling filled pilings, the layered composition of the soil medium, the influence of the transverse force upon the deformity of the pilings, and also the interface conditions, which are connected with the special designs for securing the pilings with the underwater portion of the MNGS. The use of a mathematical apparatus of "functional disconnectors" of N. M. Gersevanov and the application to the MNGS supports of unidimensional marginal tasks of construction mechanics have made it possible to develop new methodologies for calculating the supports of MNGS for strength, stability and carrying capacity. The methods that have been developed for performing the calculation lead to lowered values of the calculated amounts, as opposed to the usual design solutions.

The alternating coefficient of soil rigidity serves as the basis of the proposed methods of calculating strength, stability and the carrying capacity of the supports of off-shore oil rigs, which are built on a model of a linear-deformed medium. The value of this coefficient for various circuits of loading the support and foundation is determined on the basis of the appropriate experience considering the actual load status of the soil and the design of the supports being used. Unfortunately, such experiments are not present in the footnotes provided. In

addition, in the conditions of the soft water-saturated, muddy sediments of the Caspian Sea, where these designs are often used, it is necessary to use non-linear calculating-mechanical models. However, in the footnotes there are no recommendations for calculating the supports by taking into consideration the non-linear connection between the contact pressures and the deformations.

In the practice of designing and constructing marine stationary platforms it is necessary to define the wave loads upon the facilities. The known methods for determining wave loads have been developed, basically, for an absolutely rigid body. However, in practice one often encounters flexible structures which are deformed under the influence of the wave action. These include designs of marine deep-water stationary platforms, which during the designing stage it is necessary to consider the interaction of the deformed designs with the wave action. Due to the flexibility of the design when the wave action is flowing around we encounter the factor of the dynamic influence. The attempt to consider the dynamic factor under the influence of the wave load is seen in footnote (6), where the author gives full reign to the use of various calculating formulas for determining wave load for rigid designs. However, the results of this work were obtained without taking into consideration the phenomena of the physics of the body (design) that is deformed while flowing around by the wave action.

With the transfer to great sea depths the influence of the horizontal loads upon the construction work becomes an important consideration. When constructing deep-water insular foundations in medium, particularly soft soils, as calculations demonstrate, under the influence of significant horizontal, wind and wave loads the displacements of the piling foundation can attain significant amounts, which leads to the overstress of the piling foundation. Determining the displacement of the piling foundation makes it possible to come up with the amount of the deformation of the facility, i.e., rigidity - the key dynamic characteristic of a deep-water insular foundation.

The analysis of the schedules for moving pilings in footnote (7) demonstrates that the dependency between the deformations and loads, which are transferred to the pilings, is of a non-linear nature, and in connection with this the further clarification of the task of non-linear calculation of the piling fastening of insular foundations becomes extremely important.

#### FOOTNOTES

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- (5) M.D. Dzhafarov. Research on stability and carrying capacity of drilling filled pilings, used in foundations of off-shore oil rigs. Author's abstract, dissertation in pursuit of degree of doctor of technical sciences, Baku, AzPI, 1973, 18 pages.
- (6) F.M. Gadzhiyev. Dynamic influence when flowing around deforming bodies by a flat-parallel current. Tr. Gipromornefti. Vyp. IV, Baku, 1973, p 22.
- (7) I.F. Smagin, M. Ya. Tripol'skiy, and L.M. Shneyderov. Full-scale tests of combined drilling filled pilings upon a horizontal load. Tr. Gipromorenfti, Vyp. VII, Baku, 1974, pp 25-30.

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OIL AND GAS

SYNOPSIS OF ARTICLES IN 'CONSTRUCTION OF PIPELINES', NOVEMBER 1982

Moscow STROITEL' STVO TRUBOPROVODOV in Russian No 11, Nov 82 p 32

UDC 621.643/553.002.2:658.012.12

ACCOMPLISHING THE COMPREHENSIVE TARGET PROGRAM FOR IMPROVING THE ECONOMIC MECHANISM

/Synopsis of article by Yu. P. Batalin, pp 2-5/

/Text/ This article states that a decisive factor in transferring oil and gas construction to an intensive path of development is the subsequent carrying out of measures for the technical reoutfitting of the sector and the adoption of the latest achievements of scientific-technical progress. It examines the circumstances of the comprehensive target program for improving the economic mechanism within the USSR Ministry for the Construction of Enterprises for the Petroleum and Gas Industry in the years 1981 through 1985 and for the period up to 1990 and the measures for accomplishing it. The shortcomings in the work of the enterprises and organizations of the sector are noted; and specific proposals are provided for eliminating them. Five subsequent stages in improving the economic mechanism are defined and appropriate methodological recommendations are provided.

UDC 621.643/553.002.2+338.24.018

WAYS TO INCREASE PROFITABILITY OF CONSTRUCTION WORK

/Synopsis of article by S. K. Boreyko, pp 6-8/

/Text/ This article demonstrates the importance of programs for the construction, organizational structure, funding, availability of power and profit - the main factors which determine the profitability of the contract construction and installation organization. It provides an analysis of the work of the main administrations and associations, which makes it possible to determine the planned and actual duration of construction and the influence of these factors upon the change in the levels of general expenditures. It is noted that the level of profitability depends upon the production program of the construction organization. The calculation of the optimal load of the capacities of the construction trusts must be the basis for the planning. Conclusions are reached about the need to improve the economic mechanism within the USSR Ministry for the Construction of Enterprises for the Oil and Gas Industry based upon the comprehensive target program, which was developed for the 11th Five-Year Plan and the period up to 1990.

UDC 658.012.2

A NEW ESTIMATING INDICATOR IN INDUSTRY

/Synopsis of article by A. G. Nikul'chev, p 10/

/Text/ This article sheds light upon the importance of a new estimating indicator in industry - the standard net product - which, in contrast to the gross indicators, reflects the actual contribution of each enterprise to the production of a certain type of product. It provides a description of using the new indicator at enterprises of the association Soyuzneftegazstroykonstruktsiya - the Novokuybyshev Insulating Materials Plant, the Novosineglazovskiy and Serpukhov construction structures combines. It is noted that the use of the standard net product indicator when it is coordinated with other economic indicators, such as profit and profitability, the funds for material incentives will promote the stabilization of fulfilling the product list plan of the enterprise.

UDC 621.643/553.002.2+339.443

BASIC DIRECTIONS IN CONSERVING RESOURCES IN CONSTRUCTION FOR THE OIL AND GAS INDUSTRY

/Synopsis of article, pp 12-15/

/Text/ This article notes that expenditures for materials, structures, fuel and power resources have an important influence upon many indicators of the production and economic activity of the subelements of a sector. In considering the specific nature and problems of the construction of facilities for the oil and gas industry, this article examines the basic directions of the technical policy of the ministry in the field of conserving the key materials and fuel and energy resources. The article lists specific measures for the rational use of resources, the adoption of resource-saving and waste-free technological processes. Special attention is devoted to raising the quality of the repair of construction equipment, organizing work for restoring the units and parts of machinery and equipment.

UDC 621.643.002.2+658.322/323

IMPROVING THE PAY AND MATERIAL INCENTIVES IN LINE CONSTRUCTION

/Synopsis of article by Yu. R. Anpilogov, pp 8-9/

/Text/ This article describes the payment-by-the-job system of wages, the adoption of which is being accomplished in organizations that are engaged in line construction. It is noted that the sector has decided to construct mainline pipelines on a cost accounting comprehensive technological flow production basis, which is directed, using by-stage specialization, at the final product - a section of pipeline that is ready for testing. The data of the experiment that are cited, which was performed on the Urengoy-Uzhgorod /export/ pipeline, in the course of which it was planned to come up with answers to questions having to do with improving the organization and pay of laborers, engineering and technical workers and employees of the flow line.

UDC 553.002.2(571.1)001.12

DEVELOPMENT OF THE DESIGNING OF THE INFRASTRUCTURE OF OIL DEPOSITS IN  
WESTERN SIBERIA

/Synopsis of article by Ya. M. Kagan, pp 28-30/

/Text/ This article discusses the work experience of Giprotyumennefte-gaz in designing the infrastructure of the oil deposits of Western Siberia. It examines various ideas for siting facilities and the connecting utilities, which have made it possible to decrease their overall length. The article points out the importance of expanding the use of the unit-complex devices and facilities in a super unit form. A great deal of attention is given to optimizing design solutions for the siting of facilities and networks both at the deposits and on the whole of industrial enterprises in the oil and gas extraction region. It is noted that the experience of the joint work of the research, design and construction organizations, which has been accumulated in Western Siberia, will promote the fulfillment of the increased volumens of oil field construction. One table and one illustration.

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## NON-NUCLEAR POWER

### WATER RESERVOIR PROBLEMS AT GES CONSTRUCTION AIRED

Moscow LITERATURNAYA GAZETA in Russian 13 Oct 82 p 10

[Article by G. Kholopov, chief editor of the journal ZVEZDA and N. Neuymina, member of the editorial board of the journal ZVEZDA: "The Sea Will Not Wait"]

[Text] How can the famous health resort of the Crimea be helped? LITERATURNAYA GAZETA has already written about the fate of Koktebel. The time has come to return again to this question.

There are thousands of hectares of forest on the bottom of the future reservoir. This national wealth should not be lost!

The rear guards are poorly supplied in construction of the Sayano-Shushenskiy GES.

The decree of the CPSU Central Committee "Creative Bonds Between the Literary-Artistic Journals and the Practice of Communist Construction" states "The bond with the workers, literary posts, supervisory work at the most important national economic facilities, discussion jointly with the readers of the questions of social-economic and spiritual life enriches the literature with a modern theme, improves the level of competence of the journal publications." These words are completely applicable to the activity of the journalist post of ZVEZDA at the construction site of Sayano-Shushenskiy GES. This is the 7th year this column has existed on the pages of the Leningrad monthly. But there are cases when the efficiency of the monthly journal is not sufficient, when the question needs to be raised immediately, now! This is why the journalist post of ZVEZDA is now being published on the pages of LITERATURNAYA GAZETA.

Inertia in thinking is a tenacious disease and is more dangerous than appears at first glance.

It would seem that now, when we have behind us the experience of building many large GES's, it should be clear to everyone that the water reservoir is just as integral a part of the plan as the dam and the hydraulic turbogenerator units. Some times the creation of a water reservoir requires more expenditures than the power plant proper, sometimes, as at Bratskiy, roughly half.

Nevertheless "by tradition" the departments on whom the planning and organization of work at the Sayano-Shushenskiy GES depend focused the lion's share of attention on construction of the dam and the power plant, forgetting about the water reservoir. This is the result: when you travel on a cutter on the wonderful Sayanskiy sea which now spreads between high hills, your heart involuntarily cringes at the sight of half-buried thick cedars, and branches extending from the water with knobs. The forest in the flooding zone is being used incorrectly, and inefficiently! Millions of cubic meters of it are under water, and now these discarded trees are beginning to float, to gather at the dam, interfere with navigation and slowly rot. At the same time the construction site is experiencing an acute shortage of lumber and is forced to import it hundreds of kilometers!

The reservoir continues to be filled! This means that in the spring floods of 1986, the water level will rise to the very upper, 540-th mark.

The leading sections of the construction army, at the dam and GES building, will mainly be ready by this date. But the rear guards, those preparing the water reservoir, will be so far behind that this will cause alarm.

The problem of the water reservoir is complicated. It is broken down into several independent and various tasks. The first and foremost is to resettle the people from the flooding zone.

By agreement with the council of ministers of Tuva, new settlements are being built on the republic territory, Chaa-Khol and Eylig-Khem. The old settlements, Khayyrakan and Aryg-Bazhi, as well as the regional center of Shagonar are being expanded. Over 8,000 people have to be resettled.

What is the situation with the realization of these plans?

The trust "Shagonartyazhstroy" which is subordinate to the USSR Ministry of Heavy and Transport Machine Construction, is building the city of Shagonar, while "Krasnoyarskgesstroy" which is subordinate to the USSR Ministry of Power and Electrification, is building the settlements. It is very characteristic that the people vary, the subordination differs, and the pattern is generally the same, the plans for construction are annually fulfilled by no more than half, and sometimes by a third. It is much less in the case of resettling the people.

In 8 years, starting in 1973, 74 of the 140.5 million rubles stipulated for these purposes have been assimilated. That is one half.

Do the leaders of these ministries know about the situation regarding preparation of the reservoir?

They know. There are orders which are 2 years old for both ministries where the completely unsatisfactory situation is clearly characterized and specific tasks are formulated. But these orders are not being fulfilled!

Do they work poorly? No this cannot be said: the average output per person here is good. One can recite the names of the leading builders, such as Lansan Madyr-Ool, Orzhak Dazhdar-Ool, Aleksandr Yagodin, Valdimir Kyzyl-Ool, Valdimir Shlyk and others who work excellently. But there is an acute shortage of people.

The situation is no better with supply. Without going into all the details, we will simply state: there are local bricks and lumber at the construction site, Tuva should supply them. The only supplier of brick, the new Ust-Elegestskiy plant cannot at all be lifted above one-fourth of the rated output. There is a constant shortage of sawed lumber. The impression is created that in the council of ministers of Tuva there is not a sufficiently serious attitude towards the most important problem. This would seem to be indicated by the fact that the department of the council of ministers which oversees preparation of the flooding zone of the Sayano-Shushenskiy GES is not at all capable of monitoring the real situation. Four people huddling together in Kyzyl in a tiny uncomfortable room (isolated from the council of ministers) are loaded to the ears with annual, monthly planning and accounting. They are given the responsibility for both the resettlement, and the agriculture, and everything else. They do not even have a car to go to Shagonar or the old settlements.

The second problem is closely associated with resettlement, agriculture: the creation of animal husbandry farms, a feed base, etc. This is a separate large topic; we will only limit ourselves at this time to mentioning it.

The third problem is again the Tuva forest.

It is qualified as noncommercial-grade lumber in all the documents: "short, mainly island cliff-growing," willow, poplar and brushwood. Commercial-grade or noncommercial-grade, suitable or unsuitable as raw material for any production, it is already late to discuss this. It is now necessary to bear in mind only one thing: this cliff-growing timber is 21,000 hectares. It is necessary to clear and burn it from the entire area because here, unlike the deep canyon in the region of the GES, the reservoir will be shallow. In the navigable channels and in the sanitary zones, not only the forest will have to be cut, but the stumps will have to be extracted. The work is tedious, labor intensive, and three-fourths manual. We repeat all the "cleared" timber needs to be dried and burned; this is another year.

What is the situation with the forest?

It is standing as it stood. A total of 7 million rubles have been allocated for its clearing, and 1,000 has been spent. Yes yes, namely a thousand and not a million!

Of course there are reasons. They also depend a lot not on the builders themselves, not on "Krasnoyarskgesstroy" which is obliged to do this work. Special equipment is needed. But the hydraulic builders have not been given brush cutters, stump pullers and other "lumber" machines. They do not have extra cutters, bulldozers, tractors etc. They appealed to their ministry, but the Ministry of Power and Electrification is not capable of helping them, and the Gosplan is still silent. If all of this enormous work is done by hand, an army of special forest cutters will be required, a thousand people!

Where can they be found? Where can they be settled? How will they be paid?

The forest stands. The money lies. Time passes.

In 1986 the largest construction site of the 11th Five-Year Plan, the Sayano-Shushenskiy GES should produce complete power, 6.4 million kilowatts!

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## NON-NUCLEAR POWER

### USE OF LOCAL RELIEF RECOMMENDED FOR PROTECTION OF POWER LINES

Frunze SOVETSKAYA KIRGIZIYA in Russian 9 Feb 83 p 4

[Article by B. Grachev: "Navigational Directions for Power Builders"]

[Text] Erection of power transmission lines in mountains is associated with many difficulties, requiring great material outlays.

This work can now cost the national economy of the republic less for the specialists of the Kirghiz scientific-research department of power engineering have developed a new, comparatively simple technique for selecting the routes for future power transition lines.

The planners, selecting the route for the future power trunk line until now have proposed laying it from source to the consumer by the shortest way, along a straight line. In this case preference was given to the variant which spent fewer resources for construction of the approach groups. However this seemingly economical method does not always turn out to be justified. Even after laying the power transmission line route, additional calculation was needed for the levels of wind, rain and ice glaze loads on the conductor and design of supports. It was often found after all of this work that it was necessary to involve additional, and generally significant resources for creating a safety margin of the power trunklines.

The specialists of the department focus attention on the fact that in the majority of cases these expenditures can be avoided, and the power transmission line can be protected from wind and freezing by using the screening properties of the local relief itself. Thus, the most economical will be that power transmission route which is laid with regard for the levels of wind and glazing loads. This will mean that it is no longer necessary to strengthen the supports and increase the diameter of the conductors. For example, at the recommendations of the department workers, the LEP-110 Kazarman-Ala-Buka was built. Its supports were installed with regard for the protective properties of the local relief, that is the cliffs, hills and ravines protect them from wind and snow.

The specialists believe that the use of the new technique in building power bridges will permit a saving of up to R 50,000 per each kilometer of power transmission line.

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## NON-NUCLEAR POWER

### LIGHT-WEIGHT CONCRETE USED IN POWER LINE CONSTRUCTION

Tbilisi ZARYA VOSTOKA in Russian 29 Jan 83 p 2.

[Article by Valeriy Kalandadze, head of the laboratory of the Georgian Scientific Research Institute of Power Engineering and Hydraulic Engineering Structures, candidate of technical sciences: "Contribution of the Power Engineers"]

[Text] The colleagues from the laboratory of designs made of light-weight and standard concrete for power transmission line supports and substations of Georgian Scientific Research Institute of Power Engineering and Hydraulic Structures this year did their scientific research work outside the republic.

Thus, in the production association "Soyuztekhenergo" in Khot'kovo (Moscow Oblast) under the supervision of representatives of the laboratory of the Georgian Scientific Research Institute of Power Engineering and Hydraulic Engineering Structures, spiral-free vibrated stands were tested for power transmission lines which were fabricated at the Volga combine of production enterprises. The testing results and theoretical calculations indicated that they have necessary reliability, strength and fracture-resistance.

After studying the physical-mechanical properties of the spiral-free stands at the Volga combine of production enterprises, similar stands were made which are designed for building power transmission lines in the region of Samtredia.

Conservation of metal because no spirals were used and the number of installation rings was reduced at the Volga combine alone is 421 T, at the Mironov plant of reinforced concrete designs, 400 T. The total metal conservation at all plants of "Glavenergostroyprom" of the USSR Ministry of Power and Electrification is over 5,400 T, or over 1 million rubles per year.

Similar designs in the form of reinforced concrete supports for 6-35 kV power transmission lines were also used to build power transmission lines in the Volgograd Oblast and the Ukrainian SSR.

Our laboratory specialists also did work at the Volga combine in Rybinsk (Yaroslavl Oblast) to fabricate vibrated reinforced concrete hollow stands 16.4 m long for power transmission lines with voltage of 35 kV. The stands were made both with spirals, and in the spiral-free variant. Polyolefin pipes 225 mm in diameter, 5.5 m long were used to form the cavity in the stand body. After testing, similar hollow stands were made. They were used to build the power transmission line in the region of Kobuleti.

In the fabrication at the combine of hollow vibrated stands using polyolefin pipes as the inner lining, the concrete conservation for each stand equaled  $0.22 \text{ m}^3$ . This number for the year for the combine reaches  $5,100 \text{ m}^3$  which is a conservation of over R 128,000. In the fabrication of the hollow vibrated stands by metal stationary hollow-formers, the concrete conservation for each stand is  $0.33 \text{ m}^3$ .

The achievements of the Georgian power engineers are widely used in different sectors.

Our laboratory is working to lighten the weight of the structures and to cover the ash slag. Based on the results of studies, supporting structures made of light-weight concrete based on ash- and agloporite gravel have been introduced for the first time into practice. The first centrifuged 26-meter reinforce concrete supports were fabricated at the Mironov plant (Donetsk Oblast) and were installed in the Smolensk Oblast.

It has been calculated that the use of light-weight concrete instead of the standard in the production of power transmission line supports and substations can yield an economic effect totaling R 6 for every cubic meter of construction. If one considers the significant decrease in expenditures for transporting and installation, then this conservation in conversion for the structures will be millions of rubles.

9035

CSO: 1822/167

## NON-NUCLEAR POWER

### DIFFICULTIES IN SERVING RURAL POWER CUSTOMERS

Moscow PRAVDA in Russian 17 Feb 83 p 2

[Article by I. Lakhno and I. Troitskiy: "Waiting for Help from Electricians"]

[Text] Now, when our country produces 3.7 billion kilowatt-hours of electric power daily, many rural enterprises use it as much as plants and factories. And such large kolkhozes as "Pobeda" in the Krasnodarskiy Kray, "Druzhba narodov" in Krymskaya Oblast, the sovkhoz imeni 50th Anniversary of the USSR near Moscow and others use 15 to 25 million kilowatt-hours each annually. Rural power carries many labor-intensive operations on its shoulders. Current is used in shops, hothouses, farms, poultry factories and reprocessing enterprises. It has become irreplaceable for agriculture and animal husbandry workers. There is one trouble -- it is not always reliable. This is precisely the worry of most readers who sent letters to PRAVDA.

#### No Guarantee

Who is best acquainted with problems of rural power? Surely the one who gives people light, helps ease labor, improves living conditions and cultural service to the village, who also has an input to the fulfillment of the food provision program approved by the May (1982) Plenum of the CPSU Central Committee. They are -- linemen, line foremen and electrical engineers. They are full of bitterness and disappointment: "we cannot always guarantee our work."

"Whose fault is this? On the one hand, it appears to be ours," say the letter writers. "When we do not achieve reliability in supplying power to the farms we get complaints. On the other hand, it is not always possible to ride to the line immediately on an emergency call and repair broken lines or a fault at the substation." The cause is not due to the lineman, but to those conditions in which rural power finds itself. This is the opinion of G. Beloshapko, A. Tret'yakov and V. Myarka, workers of the Mazanovskiy Rayon Amurskaya Oblast electrical networks. What disturbs them? An acute shortage of spare parts, equipment, devices and special (four-wheel drive) vehicles.

Of course, enterprises which service networks are supposed to have vehicles equipped with radio communications, with telescopic rigs, cranes, excavators, drilling rigs... that can negotiate rough terrain.

"These are called for on the list," -- writes electrical engineer V. Zakharchenko from Kuybyshev," but actually not one of the rural subdivisions of power workers,in any case, in Kuybyshevskaya Oblast, has even half such needed equipment."

Under such conditions it is difficult to work efficiently, complain the letter writers. It is necessary to spend a considerable amount of time to find transportation to get to the damaged place. Frequently the electrical people ask the managers of farms which have lost power: "give us machines if you do not want to have huge losses." The managers resist, but finally provide transportation. They do not understand why the Minenergo [Ministry of Power and Electrification] cannot equip its enterprises with transportation and devices. Network workers do not understand this either. Especially since they have often heard from the ministry managers: the situation will improve radically as soon as the Minenergo subdivisions complete their work on building the Kam AZ [Kama Motor Vehicle Plant]. However, the plant was completed, yet equipment in enterprises with transportation and devices is not improving.

"It is very sad when I must reply that we have no transportation to get to the damaged location." stated N. Kovalenko, chairman of the shop committee of the Vyshgorodskiy Rayon Electrical Network Trade Union in Kievskaya Oblast. -- The GAZ-69 machines were taken away from us by order of the Minenergo. Without them,it is like losing our hands. Of course, we have found a way out. But not the best. We ride on ZIL, spend triple the amount of fuel and spend twice as long a time on the road."

The Kaushanskiy RES [Rayon Electrical Network] in Moldavskaya SSR has 1583 kilometers of electrical power transmission lines and 324 substations. It is difficult to cope with servicing it, said V. Vdovichenko, chief of the enterprise. The reason is a shortage of transportation. The situation is still worse with gasoline. A year ago, 13 tons were allotted and 30 tons were used. "Do not think that we are wasteful," he noted, "simply due to the lack of lightweight four-wheel brake motor vehicles, we carry two-three linemen in trucks. Who benefits from this?"

"For some reason Minenergo managers are little concerned that false economy hides poor management and wastefulness," wrote I. Kozlov, chief of the Lyubinskiy RES in Omskaya Oblast, V. Budkov, chief of the Orenburgskiy RES and V. Shatskiy, chief of the Sharlykskiy RES in the Orenburgskaya Oblast and G. Panov, deputy manager of the "Bryanskenergo" REU [Rayon Electrical Administration]. The same thought was expressed in letters by 38 workers of the Novovolynskiy RES in the Volynskaya Oblast. They note that nobody denies that fuel must be saved and the guilty ones are called to strict account for using above a certain amount. But let one imagine what would happen if a rigid limit for gasoline were set, say, for emergency medical help or fire engines. Why is not a machine riding to a damaged line not considered an emergency? The result is that kopecks are saved on gasoline and tens of thousands of rubles are lost for the products of the fields and farms due to malfunctions of electrical networks.

The writers consider that this situation may be explained by one of two reasons. Either the Minenergo cannot prove to the USSR Gosplan how many and what kind of transportation facilities, devices and fuel are needed by the electrical network enterprises, or that they get everything that they need, but the lion's share is directed to their main construction administrations. Surely, funds for material and equipment for rural power workers should be specified as a separate item.

#### Contract Did Not Take Root

No matter what letter we pick up it contains the following complaints: supplies to network workers of transportation, materials and spare parts are very poorly organized. "Precisely this," write electrical linemen N. Kosyatov, P. Shedriks, A. Obnoskin, driver M. Kaplich and V. Teslya, party bureau secretary of the Karagandinskiy Enterprise of High Voltage Electrical Networks -- "leads to unreliable work. Moreover, take the introduction of progressive labor methods. For example, the brigade contract. Its efficiency in other industries was proven in practice. Why are we worse?"

A year ago two collectives of the enterprise changed over to this progressive method. Its effectiveness was felt immediately. Repair quality improved, labor productivity increased by 37 percent and the average wage increased by 16 percent. A decision was made to broaden the brigade contract. Here, they stumbled. It was found that the enterprise cannot supply materials regularly even to the first two brigades. As a result, a good beginning not strengthened by material resources has not developed.

The advantages of a brigade contract are obvious. Its wider introduction depends greatly on the initiative of the managers of power enterprises. But not only on them alone. V. Zakharchenko, electrical engineer from Kuybyshev, for example, states that workers of the electrical network enterprises of the oblast are acquainted with this method and went to study advanced experience at the Kostroma electrical network, where the brigade contract was introduced everywhere. After returning they tried the brigade contract in the comprehensive repairs of substations. But they did nothing further. Why?

"Not to discredit the brigade contract idea itself," explained V. Zakharchenko, "but with a supply level for basic materials and spare parts satisfied only by 20 to 40 percent, with a constant shortage of transportation, devices, tools and gasoline, it is impossible to start applying the brigade contract widely. However, to create special, hothouse conditions for individual brigades in the entire enterprise -- conscience does not permit this."

"Is it possible that this progressive method which is so advantageous will remain only a dream?" ask rural power workers. "How long will we lag behind at the tail end of other industries and wait for the time when it is our turn to introduce the brigade at electrical network enterprises?"

"By Our Own Wish"

Z. Khudyakova, electrical lineman of the Kilemaskiy Section of the Semenovskiy RES of the Mariyskaya ASSR, decided to share her concerns and alarms with the editor. "Ours is a small substation," she writes, "we service five kolkhozes, a sovkhoz and about ten other enterprises. All the lines pass through a forest. If there is a wind, there are slides and conductors break. It is necessary to break through on foot, dragging conductors, insulators, grapplers, axes, saws... It is impossible to ride -- there are no four-wheel motor vehicles. Yet, somewhere on the farm milking machines stand idle, lights go out in kolkhoz homes and we are treated as 'emergency help'."

V. Antonov, deputy secretary of the party of the Kingiseppskiye networks in the Leningradskaya Oblast writes about complications in the work of the electrical workers: "Surely, soon we will have nobody to send to the line. Veterans retire on pensions, while we cannot attract young workers."

Why? because letter writers say, the electrical worker's wages are low and he has very few conveniences. "Young linemen come," says M. Durov, party secretary of the Uzbek SSR Minenergo, "work for two-three years and 'resign by personal request.' In fact, besides, in the same sovkhoz, there is a Glavsredazsovkhozstroy electrician. His wages are higher. Yet, both do equal work. The kolkhoz lineman is allotted a farm section, but not our linemen, although he services the same lines."

Here is another letter. It was signed by the entire collective of the Dron'ki-Rechitskiy network enterprise in Gomel'skaya Oblast. The writers have serious reproaches for the managers of the "Gomel'energo" Administration. The workers work hard without skimping on efforts. Yet their working conditions are not too good. The linemen live in various villages. They travel 7 to 15 kilometers to their enterprises by hitching rides on trucks and frequently travel on foot.

How has it come about, wonder the writers of many letters, that rural power got into such an unenviable condition? Yet it is the concern of subdivisions of Minenergo, Goskomsel'khoztekhnika and communal services.

Probably, managers and specialists of the above-named organizations will argue as follows: The "Sel'khozenergo" is an organization created for servicing rural consumers. But let us hear "Sel'khozenergo," which also sent many letters to PRAVDA.

"An electrical motor fails and suddenly there is a problem," stated V. Girenko, chief engineer of the Nikolayevskaya Oblast "Sel'khozenergo" Association. "Where to repair it? We have no base of our own. Half the motors we send to Goskomsel'khoztekhnika enterprises, and we repair the rest where we can." When a breakage occurs, we look everywhere to find out who can repair the motor the quickest," writes G. Shcherbakov, electrician at the "Rossiya" kolkhoz of the Belorechenskiy Rayon in the Krasnodarskiy Kray. "'Sel'khoztekhnika' takes a long time for repairs and does it poorly. At times we are forced to call on the services of handcraftsmen. Costs are high and there is little sense to it."

"With the scarcity of transportation, equipment and spare parts in rural power," writes V. Pavlyk, secretary of kolkhoz imeni Il'ich of the Shishatskiy Rayon in Poltavskaya Oblast, "we must be especially thrifty and make better use of internal reserves of each kolkhoz and sovkhoz. And we have them. We were convinced of that in our own experience. The "Sel'khozenergo" and electrical network enterprises have frequently failed us. Therefore, the kolkhoz created a chief electrician department: 12 mechanics and linemen headed by G. Zakladnyy. We supplied them with transportation and spare parts. They eliminated network failures immediately. Now we have no interruptions in the electrical supply."

Rural power workers of the Krasogvardeyskiy Rayon in the Krymskaya Oblast, A. Yermakov, V. Tikhonov and others (a total of eight signatures), talking about the necessity of better equipment for electric network enterprises and the more insistent introduction of the experience of leading workers ask, at the same time, whether their voices will be heard by managers of the Minenergo?

The PRAVDA mail brings replies from the Minenergo. Ye. I. Borisov, deputy minister, states: "A number of measures are being taken by the industry directed toward the improvement of service to electrical power users. Repair-operational centers are being created, the number of traveling and operational brigades is being increased. To keep linemen at enterprises and rayon electric networks, a 20-percent raise in wages for the traveling nature of the work was given two years ago, and for night work, a 35-percent raise was introduced.

The reply also contained some disturbing information. At present, about 280,000 kilometers of networks are in unsatisfactory technical condition. There are no sufficient material-equipment resources for their repairs.

Since not everything depends on the Minenergo, PRAVDA readers comment that perhaps the USSR Gosplan and Gossnab, ministries and departments in the agricultural-industrial complex of the country will exhibit greater interest in the fate of rural power and the creation of a reliable electric power supply to kolkhozes and sovkhozes. Rural power workers are right to count on such help.

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CSO: 1822/170

BRIEFS

WHERE GES ARE BORN -- A 10,000-ton siphon was shipped right on schedule to Krasnoyarsk from the Perm' "Gidrostal'konstruktsiya" Plant. Hot water will flow through this steel pipe which connects the Yenisey shore to the new buildings at Krasnoyarsk on the right-hand shore. "This is not an order which is entirely customary for us," stated S. Bol'shev, director of the enterprise, "since the basic products of the plant, as a rule, are intended for hydraulic power plant builders. Almost all GES on the Yenisey and its tributaries were built with the help of Perm' specialists -- the Krasnoyarskaya, Sayano-Shushenskaya, Boguchanskaya and Ust'-Khantayskaya. Recently documentation arrived for equipment of the Kureyskaya GES. We will complete the order on schedule -- such is the tradition of the collective." On the stand of the huge frame an automatic welding machine cuts out of a steel sheet an intermediate product of a complicated shape. Here, the jet flame "draws" gates and water lines, passage chambers - steel structures of about 200 items made in the plant's shops. Each is nonstandard as hydraulic power plants differ from each other. For example, a water pipeline was required of an entirely special shape for the Ust'-Khantayskiy GES: its machinery hall is located at a depth of 80 meters. From the stand the intermediate products are sent to the assembly line where they acquire volumetric shapes. Booming waterlines, openwork scaffolds later form visible and invisible GES silhouettes. A precise check of the drawings and finished parts is made. As a rule, there are no deviations. The plant which consumes over 15,000 tons of metal annually does not waste even one extra kilogram. Most experienced welders and assemblers work in the shops. [R. Trusov (Perm')] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Jan 83 p2] 2291.

ARAGVI WATER CONDUIT -- In meeting this river one begins his acquaintance with Georgia's outstanding personality in Russia in the past century. The Aragvi is a hospitable host which separates high mountains with its irrepressible waves forming a canyon of rare beauty and a trusty guide showed the path to desired guests... Precisely along the picturesque shores of this mountainous river lies the famous Georgian-Military highway that became a bridge of friendship between the Russian and Georgian people. As before, the Aragvi flows noisily but in its noise there are other powerful rumbles: roars of machines and, at times -- blasts. It is here in the canyon near the Zhinvali Settlement that Georgian hydraulic builders are creating a dam to put the river's force to the use of the national economy: the 130,000 kilowatt electrical power plant, the Zhinval'skaya, is being built. By the way, this important

hydraulic center has still another purpose. Here a water conduit capable of providing 4.6 m<sup>3</sup> per sec. of drinking water will begin. The conduit will be almost 50 kilometers long and will bring the clear streams of the Aragvi to to the Georgian capital. The main section on the building site is a bypass tunnel through which the Aragvi gets to the vanes of the turbines. It is being tunneled under extremely complicated conditions -- underground waters, falling rocks etc., interfere with the work, but the tunnelers, under the leadership of A. Chaladze, chief of the Zhinvaliges Construction Administration, are nearly finished. The tunnelers are in a labor competition with a collective which is building a dam 101 meters high and will gather into its powerful body 5,360,000 cubic meters of earth. At present, it remains to pour about 800,000 cubic meters of earth." The Zhinval'skiy hydraulic center must be placed in operation in this five-year plan period," stated A. Chaladze, "and we will not fail. The pledge of this is the enthusiasm of hundreds of builders who are helped in this special design construction project by representatives of practically all republics in the country. And while this year we must complete construction-installation work in an amount of 10 million rubles, now, having calculated our possibilities, we have obligated ourselves to fulfill the annual task by the 60th Anniversary of the Formation of the USSR by 150 percent." [Text] [Moscow STROITEL'NAYA GAZETA in Russian Nov 82 p 4] 2291.

POWER LINE IN OPERATION -- The 750 kilovolt LEP [Electrical Power Transmission Line] from the Kurskaya nuclear power plant to the "Metallurgicheskaya" substation was placed in operation. It will satisfy fully requirements of the Oskol'skiy Electric metallurgical Combine imeni L. I. Brezhnev and the ore-mining enterprises of the large complex created here. The builders of the power bridge completed the work ahead of schedule [By Yu. Antropov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Jan 83 p 1] 2291.

SURGUT GRES -- The fifteenth power unit was placed in operation at the Surgutskaya GRES. With its start the plant, whose capacity exceeded 3 million kilowatts, became one of the four electrical-heat power enterprises in the country with similar equipment [By Z. Zhdanov] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 21 Jun 83 p 2] 2291.

NEW TASH-KUMYRSKAYA GES -- The relay race of glorious achievements of the Kupsayskaya GES builders which was completed ahead of schedule in November 1982 was joined by a new power plant of the Narynskaya cascade power plant in Kirgizia -- the Tash-Kumyrskaya. It is located where the stormy Naryn River breaks loose into the open of the Fergana plane. The basic subdivisions of the Naryngidrostroy were transferred here. Construction has begun of a gravel sorting plant, and concrete plants. At the same time, a foundation pit is being prepared for the GES building. Brigades of A. Karankin, K. Igemberdyvayev, M. Sabirov and other glorious builders have been working here since the very first day. [By I. Akhmetov] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 9 Jan 83 p 2] 2291.

EKIBASTUZ-KUSTANAY SUPERHIGHVOLTAGE LINE -- A new peak was reached by builders of the superhighvoltage Ekibastuz-Kustanay power bridge, whose construction was specified by the 26th party congress. The "Spetsset'stroy" Trust collective completed the hanging of the wires on the 500-kilometer Ekibastuz-Kokchetav section. "Flow-line technology helps maintain the intensive schedule of construction-installation work," stated N. Preobrazhenskiy, trust manager. The first specialized brigade is preparing the foundation pit, the second -- installing masts assembled on the industrial site, the third -- hanging wires. Minutes saved in each operation are added into hours of acceleration of building the main electrical power line. This year the superpower LEP-1150 will arrive at Kustanay, which will make it possible to improve the electrical power supply to agricultural-industrial complexes of the virgin soil region and combines that "feed" iron ore to the Urals. [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 9 Jan 83 p 1] 2291.

EFFICIENT COMPUTER -- Microcomputers introduced at the Novopolotskiy TETs by scientists and students of the Belorussian Polytechnical Institute helped TETs power workers improve the efficiency of its equipment. The miniature computer was entrusted with one of the most accurate operations -- regulating the steam temperature in the boiler. At constant load variations, traditional automatic devices switched the equipment to another operating mode without taking into account the delay needed for the readjustment, and they wore out from the rapid temperature drops. The smart computer analyzes the situation, makes the necessary corrections and improves the accuracy of regulating the technological modes by two- to-four times. Especially valuable is the fact that a random failure of electronics does not result in an emergency situation. In switching off, it transfers the controlling functions to the traditional automatic devices which are preserved as standby devices. The microcomputers operate by the self-learning method, constantly accumulating in their memories the situations encountered and versions of the solutions adopted. [Text] [Minsk SOVETSKAYA BELORUSSIYA in Russian 14 Jan 83 p 1] 2291.

RURAL POWER BRIDGES -- A festive "blue light" was seen New Year's night by shepherds of the imeni 25th Party Congress sovkhoz in At-Bashinskiy Rayon. They were wintering with their flocks at remote pastures in Tysh-Kyga. Constant electrical power is sent to the homes of the chabans [shepherds] by a high voltage LEP built by the workers of the Narynskaya PKM [Mobile Mechanized Column] of the "Kirgizelektroset'stroy" Trust. It went into operation on the eve of the 60th Anniversary of the formation of the SSR. A great amount of construction-installation work was done to build this important facility. A 30-kilometer electric power transmission line was strung from the village of At-Bashi, and 20 substations and distribution networks were built. Some 24 sheep pens and the same number of chaban homes were connected to this power system. In converting to life the Food Provision Program, workers of the Narynskaya PKM increased the volume of work on building electrical networks considerably. They put in operation three large rural power bridges 150 kilometers long at At-Bashinskiy, At-Talinskiy and Tyan'-Shanskiy rayons. This provided centralized electrical power to 70 rural agricultural facilities. [Text] [Frunze SOVETSKAYA KIRKGIZIA in Russian 8 Jan 83 p 1] 2291.

NIZHNEKAMSKIY UNIT -- The eleventh unit of the Nizhnekamskiy GES began industrial operation. Collectives of Nizhnekamskgesstroy, Gidroelektromontazh, Spetsgidroenergomontazh, and other USSR Minenergo organizations worked well on its construction. [By A. Shekhirev] [Moscow STROITEL'NAYA GAZETA in Russian 21 Jan 83 p 2] 2291.

NEW POWER LINE -- Current has begun to flow in the 330 kilovolt electric power transmission line that ties the cities of Resekne and Daugavpils. It makes possible the more efficient distribution of electric power from the northern rayons where the largest electric power plants of the region are located, to the southern rayons of the Unified Power System of the North-West of the country, and raises the reliability of their power supply. The new LEP is a component part of the Belorussian, Lithuanian, Estonian SSR and the Leningradskaya and Kaliningradskaya oblasts. This is one graphic example of the friendship and mutual help of peoples in our country. [Text] [Riga SOVETSKAYA LATVIYA in Russian 31 Dec 82 p 1] 2291.

NIZHNEKAMSKAYA GES -- Brezhnev, Tatarskaya SSR -- Power cranes are in operation at the site of the Nizhnekamskaya GES. The installation of the twelfth unit has begun here. From the first days of the year the hydraulic builders have maintained the high rate achieved in December during the period of starting up the previous electrical machine. The tone of the competition is set by M. Latypov's brigade which is building the machinery hall. The installers have obligated themselves to complete the next in turn span of the building in 18 days -- a week sooner than the previous one. The work is carried on constantly in three shifts. The installers are three days ahead of schedule due to the reduction in intrashift idle time and the efficient utilization of the equipment. Carpenter-concrete workers brigades of G. Popov, Z. Yunusov and V. Krasnov are completing individual walls of the crater and the helical chamber of the unit. Specialists from the "Spetsgidroenergomontazh" Trust, not waiting for the completion of this work, began consolidating the assembly of the twelfth unit. The dam of the hydraulic center continues to grow. Along the shores of the water reservoir -- in Tatariya and Bashkiria -- builders are lining petroleum deposits with levees; protecting low-lying meadows and arable lands with dams and facing the embankment at Saraput in Udmurtsk with concrete. At present the water pressure at the hydraulic power plant is ten meters. By the start-up of the last, the sixteenth unit, its level will rise by six more meters. The final stage of the Kama hydraulic power cascade will reach its full capacity of 1,238,000 kilowatts [Text] [Moscow SOLSIALISTICHESKAYA INDUSTRIYA in Russian 19 Jan 83 p 1] 2291.

NEW LEP-110 -- The new Taldy-Ushtobe LEP-110 put in operation will raise the reliability of the power supply to the agricultural-industrial complex in Southern Balkhash. The 48-kilometer long power bridge was built in the "Valley of Fogs" -- the so-called valley of the Karatal River. In the fall and winter thick fogs cling here. These lead to the formation of a thick ring of ice 10 to 15 centimeters in diameter on the conductors, and are capable of breaking the line. To fight this, the mainline is equipped with an electronic system of accelerated melting of the ice glaze by controlled shorting of the line. Apparatus automatically signal the dispatcher with lights and sound alarms at the start of this dangerous process. The LEP in the "Valley of Fogs"

will provide a continuous power supply to animal husbandry complexes, farms and range breeding animal husbandry sections over several branches of lower voltage electrical power transmission lines. These are built across sand dunes and salt marshes from the Dzhungarskiy Crest to the shores of Lake Balkhash. Since the beginning of the five-year plan period, 1500 kilometers of rural LEP have already been built for the agricultural-industrial needs of the Semirech'ye complex. All the sovkhozes and kolkhozes in the oblast have already been transferred to the centralized power supply from the state power system [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 18 Jan 83 p 1] 2291.

LEP PROCEEDS NORTH -- Yuzhno-Sakhalinsk -- A substation built in the Tymovskoye Settlement received electrical power from the Sakhalinskaya GRES. A unified power system is already in operation in Sakhalin and provides electricity to many cities and ports in the southern part of the island. At present, LEP poles are moving farther and farther north -- to cities and settlements of petroleum producers and enterprises for reprocessing fish and lumber [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 18 Jan 83 p 1] 2291.

ROGUNDKAYA GES -- The dam of the Rogunskaya GES which is being built now on the Vakhsha River, will be the highest in the world -- about 350 meters. The Earthquake Resistant Construction and Seismology Institute (Dushanbe) is doing model investigations of the dam. It is "shaken" on a vibrating platform and then the investigation results are studied in order to give practical advice to the builders. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 21 Nov 82 p 4] 2291.

STAVROPOL'SKIY GRES -- Solnechnodol'sk (Stavropol'skiy Kray) -- Construction has begun at the Stavropol'skiy GRES of the eighth and last power unit. The foundation was built under the turbine. It is planned to complete all installation work by the end of November. The unit will begin operation this year. With the installation of the new unit the total capacity of the electrical power plant will be 2.4 million kilowatts. This is one of the largest power enterprises in the Northern Caucasus. Solnechnodol'sk --a modern power workers' settlement grew along with the GRES on the shore of the picturesque Novotroitskiy water reservoir. [By V. Pankratov] [Text] [Moscow PRAVDA in Russian 18 Jan 83 p 1] 2291.

KRASNOGRAD-ZACHEPILOVKA LEP -- Khar'kov -- Yesterday the reliability of supplying power to the agricultural-industrial complex was improved by putting in operation the 110 kilovolt Krasnograd-Zachepilovka electric power transmission line. This completes the connection of the farms of all rayons to two supply sources. Now, in case the basic channel goes out of order, the automatic control system will immediately switch the rural enterprise to the reserve LEP. Branched electrical mains were created at Kharkovshchina. Their total length exceeded 32,000 kilometers. The transformer substations being erected at present are located in solidly constructed buildings which will provide faultless operation of the equipment. The major part of the wooden poles were replaced by reinforced concrete in the villages. At the same time, thrifty utilization of power resources is being promoted. The "Kharenenergo" Production Association collective is helped in this by a computer. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Jan p 2] 2291.

TURUKHANSKIY GES CONSTRUCTION--Leningrad--There is as yet on the earth no enormous reservoir, no true deep-water sea extending over a thousand kilometers, but there will be -- it will spread where our country's largest hydroelectric power plant will be constructed. Its dam will cover the river Nizhniy Tunguska not far from the city of Turukhanska, in the Krasnoyarskiy Kray. The specialists of the Leningrad department of the institute "Gidroproyekt" imeni S. Ya. Zhuk are nowmaking extensive searches and scientific research to create the Turukhanskiy GES. "Development of the technical-economic documents for planning and construction of this plant is currently ending," says the chief engineer of the project N. Ovdiyenko. "It is planned to install at it 20 hydraulic turbogenerator units of a million kilowatts each." Thus according to preliminary calculations, the new hydroelectric power plant will almost be three-fold greater than the output of the currently constructed Sayano-Shushenskiy GES. Start-up of the Turukhanskiy GES is planned in stages. The Leningrad machine builders and installers are faced with making an important contribution to construction of the Turukhanskiy GES in this harsh region of permafrost. The association "Leningradskiy Metallichесkiy Zavod" will need to make hydraulic turbines with giant working wheels 8-9 mm in diameter, while the electric power workers must supply the giant generators. In addition to the collectives from the shores of the Neva, it remains to develop production of new types of unique electrical engineering and hydromechanical equipment. [Article by V. Alyushinskiy] [Text] [Moscow IZVESTIYA in Russian 29 Jan 83 p 3] 9035

BUZACHI PENINSULA ELECTRICITY--Shevchenko--Reliable electricity supply to the Buzachi Peninsula where oil fields are being developed at accelerated rates has improved. At the Mangyshlak GRES, the first block with power of 210 megawatts operating on natural gas has been put on a working load. More electricity is being required for the oil fields, refineries, for one of the country's largest plastic plants. But it is expensive and long to lay power transmission lines here from the already active power plants. This is why development of an in-house energy base was chosen. The new GRES will switch the transmission lines to higher voltage, 220 kilovolts, which will significantly increase their throughput. [Text] [Moscow IZVESTIYA in Russian 27 Feb 83 p 1] 9035

MOUNTAIN POWER TRANSMISSION LINE--Alma-Ata--Diesel power plants at production sections of distant facilities in the high-mountain Narynkolskiy region of the Alma-Ata Oblast have been installed. An eighty-kilometer power transmission line Kegen-Tekes has been put into operation in the zone of rapidly developing sheep raising. Inexpensive energy is supplied on it to the houses of the shepherds, the feed shops, to the fattening and watering areas. With the start-up of the power transmission line, it will be possible to completely shift sheep raising in the region to an industrial base. The production of electricity in Kazakhstan will increase this year by 17 percent, or up to 76 billion kilowatt-hours. [Text] [Moscow IZVESTIYA in Russian 7 Mar 83 p 1] 9035

STEPPE POWER TRANSMISSION LINE--The 200-kilometer power transmission line Zhana-Semey-Karakul which was laid in the heart of the Chingiztauskiy steppe was industrially loaded. Yesterday, the power transmission line produced electricity for the shepherd houses. It will help to improve the daily life of the livestock breeders, expand mechanization of the production processes at the farms. Before the end of the five-year plan, it is planned to build a ring of power transmission lines in the oblast with total length of 1,200 kilometers. It will provide electricity to over 100 farms and sections of range animal husbandry. [Text] [Moscow TRUD in Russian 26 Feb 83 p 1] 9035

ELECTRICITY TO FINLAND--Not far from the border with Finland, Vyborg, an unusual, so-called rectification-inverter substation structure has been built. It linked the powerful energy systems of two countries. By a contract with the stockholder society "Imatran Voyma" (Helsinki) and the all-union association "Energomashkport," our country is supplying to its northern neighbor electricity generated by the "Lenenergo" power plants. "The scientists and labor collective of electrical engineering industry and power engineering took an active part in solving this complex scientific-technical task," relates V. Kulakov, leading specialist of the All-Union Electrical Engineering Institute imeni V. I. Lenin. The fact is that it was not simple to link the two national power systems: they have their individual differences. This is why it was necessary to construct an intermediate transformer substation, and to "insert" direct current. Here, under one roof, the alternating current coming from "Lenenergo" is transformed first into direct current, and then, already with regard for the parameters of the Finnish power system, again into alternating. Thus, the Vyborg substation guarantees regulation of power current regardless of the changes in frequency and voltages of the linked systems. The second transformer block has been started up at the Vyborg substation. The transmitted power reached the contract magnitude, 600,000 kilowatts. The Vyborg substation has become the world's largest asynchronous link between national power systems. [Article by M. Glukhovskiy] [Text] [Moscow IZVESTIYA in Russian 25 Jan 83 p 3] 9035

POWER TRANSMISSION EQUIPMENT--Zaporozhye, 3 Mar--In the production association "Zaporozhtransformator," an apparatus is being fabricated which is designed for the superlong-distance power transmission line Ekibastuz-center of the country, with voltage of 1,500 kilovolts. The best brigades, headed by A. Ogotskiy and Ye. Cherdakova are doing the assembly. The fulfillment of the work schedule is monitored daily by the leaders of the association and the All-Union Scientific Research and Planning-Design Institute of Transformer Construction. "Similar transformers were planned and manufactured in Zaporozhye even before," said the head of the design department of the institute, V. Sukhanov. "As compared to those previously made, this apparatus is twice as powerful, and only slightly larger. We are faced with fabricating a batch made of 26 transformers. If we make transformers of the previous design for the same purposes, we would have to spend an additional, approximately 5,000 tons of steel and 858 tons of spun copper. In addition, each unit would have considerably lower inevitable electricity losses. The total economic effect from using the new transformers in the national economy will be R 16.9 million per year." [Article by outside PRAVDA correspondent I. Sergeyeva] [Text] [Moscow PRAVDA in Russian 4 Mar 83 p 1] 9035

HYDRAULIC TURBOGENERATOR UNIT--Assembly of the eighth hydraulic turbogenerator unit was started yesterday at the Cheboksary GES. Work is being done by the progressive method of large-block installation. The youngest hydroelectric plant on the Volga continues to be built, while its active units have already provided the country's unified power system with over 2 billion kilowatt-hours of electricity. This year, another 4 electrical machines will be put into operation. By the end of the five-year plan, the power of the GES will reach 1.4 million kilowatts with start-up of all the hydraulic turbogenerator units. [Text] [Moscow TRUD in Russian 2 Mar 83 p 1] 9035

NERYUNGRI GRES--Installation of the boiler and production equipment of the first power unit of the Neryungri GRES has begun. Without waiting for the end of construction of the machine hall, the installers equipped the heat workshops. The enlarged blocks, weighing up to 100 tons are being assembled in them from parts and designs coming on the route of the minor BAM [Baykal-Amur Trunkline]. This permitted acceleration of the work. The builders of the Neryungri GRES have been obliged to provide an industrial current for the facilities of the south Yakutsk territorial-production complex by the end of the year. [Text] [Moscow TRUD in Russian 3 Mar 83 p 1] 9035

AUTOMATIC ANTI-ACCIDENT MACHINE--The energy power of the republic is steadily rising. New power plants are being put into operation, and the length of the power transmission lines is being increased. This is why especial attention is focused on safe working conditions, the broad introduction of reliable devices which prevent the malfunctioning of

equipment. The urgent question of developing systems for automatic anti-accident machines on bonds with the unified energy system of CEMA member countries and the unified energy system of the center of the country has been examined in the Ukrainian SSR Ministry of Power and Electrification. The adopted decree notes that in the energy associations of the sector, two intersystem sets of automatic anti-accident machines are successfully functioning. If necessary, they instantaneously guarantee a change in the generation and consumption of energy of the Chernobylskiy AES, the enterprises of the Vinnitsaenergo, Dneproenergo, Donbassenergo, Kievenergo, and the hydraulic turbogenerator units of the Dnieper cascade. Great complexity of the automatic anti-accident machines increases the requirements for their operation. The board of the ministry has focused attention on the need for advanced development and improvement in the sets of automatic anti-accident machines at the Chernobylskiy and Rovenskiy AES's. However, installation and start-up of the complex on a computer of the substation "Zapadnoykrainskaya," and at a number of other power engineering facilities is going slowly. The ministry has outlined a number of measures aimed at eliminating the shortcomings. Periods have been defined for completing work and responsible individuals have been appointed. [Article by V. Babenko] [Text] [Kiev PRAVDA UKRAINY in Russian 28 Nov 82 p 2] 9035

GES START-UP--Shamkhor, 25 Jan--The Shamkhor GES was brought to the level of generating a million kilowatt-hours of electricity per day ahead of schedule. Training of the service personnel helped to set up rhythmic work of the station. The group of specialists even during the course of construction gained practical experience at the stations of the cascade of the Mingechaurskiy GES where the leading methods of production organization had been imitated. The shifts of Fayg Tagizade and Oktay Pirverdiyev, machine operators of the turbine Boris Akhmedov and Allakhgulu Novruzov set up precise operation of the unit. [Text] [Baku VYSHKA in Russian 26 Jan 83 p 1] 9035

EQUIPMENT RELIABILITY--It is known that increased requirements in relation to reliability and durability are made for the equipment of modern power plants. However, sooner or later, the metal "becomes tired," and the danger of an emergency situation develops. The set of original methods developed by the collective of scientists of Azerbaijan, Moscow and Leningrad makes it possible not only to perceive this unpleasant moment with a high degree of accuracy, but also to greatly postpone it. The new technique of calculation and improvement in reliability of equipment using the criterion of resistance to the formation of fractures is based on the latest achievements of a young science, failure mechanics. It affords real possibilities for more complete use of the strength reserve of power engineering units, significant reduction in the outlays for their major repair with lengthy operation. One of the practical applications of the work of the scientists was at the Kostromskiy GRES.

After the appropriate preparation conducted with the active participation of the production engineers and specialists of "Mosenergoremont," it was decided to lengthen the inter-repair service life of the power units with output of 300 megawatts from 4 to 8 years. [Article by M. Polyanin, chief engineer of "Mosenergoremont" of the USSR Ministry of Power and Electrification] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Jan 83 p 2] 9035

NEW POWER TRANSMISSION LINE--Tynda (Amur Oblast), 13 Jan--The second branch of the LEP-220 Tynda-Zeyskiy GES extending almost 500 kilometers has been supplied with voltage. It will guarantee reliable energy supply to the settlements and stations of the central part of the Baykal-Amur Trunkline facilities of the south Yakutsk territorial-production complex. Two-thirds of the power transmission line has been laid along the route of BAM, where the most complicated section was the two-kilometer crossing of the Zeyskiy water reservoir. Construction of the power bridge on this section was reduced because of the use of an original innovation. The supports of the power transmission line as high as a thirty-story house were installed not on powerful foundations made of monolithic reinforced concrete, but on light precast blocks of plant preparation. Having reliably secured them with rocky soil, by special anchor devices, the installers gave the structure a great margin of safety. [Text] [Moscow PRAVDA in Russian 14 Jan 83 p 2] 9035

POWER TRANSMISSION LINE--The LEP-220 Mikun-Kotlas was loaded. This energy bridge over 200 kilometers long was laid on the northern taiga, bogs and swamps. Its start-up made it possible to make power supply to the kol-khozes and sovkhozes located on the boundary of the Komi ASSR, Arkhangelsk and Vologda Oblasts more reliable. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 12 Dec 82 p 2] 9035

NEW KUZBASS POWER TRANSMISSION LINE--The Krasnoyarsk builders of the power transmission line Sayano-Shushenskiy GES-Novokuznetsk have reached the boundaries of the Kemerovo Oblast. When the power transmission line with voltage of 500 kilovolts is started, the enterprises of the south Kuzbass will cease to feel an energy shortage. [Text] [Moscow PRAVDA in Russian 20 Jan 83 p 2] 9035

BAYPAZINSKIY GES CONSTRUCTION--Nurek, Tajik SSR--Erection of the building of the hydroelectric plant has started at the Baypazinskiy GES at Vakhsha. This is one of the main objects of the construction site. Here there is a machine hall, control panel and other services. The Baypazinskiy GES, as stipulated by the commitments of the builders, is being constructed ahead of the schedule by a year. This is the effect of building the hydroelectric power plant by the "turnkey method" through the use of bank credit. This method of organization and financing of the work which is being done in hydraulic construction for the first time makes it possible to use

capital with high efficiency, to direct it for erection of those facilities on whose start-up the most rapid start-up of the entire hydrosystem depends. For example, together with the planners, the builders changed the standard work plan: without waiting for the diversion of Vakhsha on a special tunnel which is still under construction, using a dam they gained from the river a necessary platform for the GES building. Although it was necessary to increase the outlays, this made it possible to gain about a year. The additional resources were compensated for by the electricity of the units which were started up ahead of schedule. The Baypazinskiy acceleration was promoted by the traditional competition on the principle "worker's relay race" of the Tajik hydro-power builders with the collectives of the enterprises who are supplying the equipment. The machine builders of the associations "Kharkovskiy turbinnyy zavod," "Uralelektrotyazhmash" (Sverdlovsk) and others have been obliged to manufacture it ahead of schedule. The workers of Kharkov have already prepared certain hydraulic turbine assemblies for Baypaza. Their installation will be done simultaneously with construction of the machine hall. With the start-up of the Baypazinskiy GES with power of 600,000 kilowatts, production of electricity in Tajikistan will reach the planned level by the end of this five-year plan, 16 billion kilowatt-hours per year. [Article by G. Deynichenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Jan 83 p 1] 9035

KIRGHIZ POWER TRANSMISSION LINE--A multiple-kilometer high-voltage power transmission line which supplied energy to the new powerful pumping stations of Shamsi and Akdzhar in the central Tyan-Shan has been put into operation in Kirghiziya. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 51, Dec 82 p 5] 9035

TUYAMUYUNSKIY HYDROSYSTEM--Tashkent, 2 Feb--The first phase of one of the country's largest Tuyamuyunskiy hydrosystem was put into operation in the Amudar'ye. Two reservoirs with capacity of 2,600,000,000 cubic meters of new irrigation-energy complex will guarantee stable irrigation of the fields of Karakalpakiya, Khorezmskiy Oblast in Uzbekistan and Chardzhou Oblast in Turkmeniya. Four units of the power plant with power of 100,000 kilowatts were also put into operation. [Text] [Moscow PRAVDA 3 Feb 83 p 1] 9035

NOVOSVERDLOVSK TETS--The heart of the Novosverdlovsk TETs began to beat. This is one of the largest central heating and power plants in the central Urals. Start-up of the plant for full power will provide power and heat to the residential microregion with population of 200,000, and will permit coverage in the oblast center of a number of small boiler houses. [Article by V. Chumarov] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 16 Jan 83 p 2] 9035

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